12.3

Pg 15-

57. a) $a_1 = 5 \quad r = 2$

$a_n = 5(2)^{n-1}$

b) $S_4 = a_1\left(\frac{1-r^4}{1-r}\right) = 5\left(\frac{1-2^4}{1-2}\right) = 75$ 75 skydivers in 4 days

58) a) $a_1 = 32\left(\frac{1}{2}\right)^{n-1}$ $1 \le n \le 6$ are logical values because $a_6 = 1$

b) $S_6 = a_1\left(\frac{1-r^6}{1-r}\right)$

$= 32\left(\frac{1-\left(\frac{1}{2}\right)^6}{1-\frac{1}{2}}\right) = 63$ 63 games are played in the tournament

59) After the 1st pass 512 items remain

so $a_1 = 512$ and $r = \frac{1}{2}$

$a_n = 512\left(\frac{1}{2}\right)^{n-1}$

b) $1 = 512\left(\frac{1}{2}\right)^{n-1}$ ← Find n when $a_n = 1$

$\frac{1}{512} = \frac{1}{2}^{n-1}$

$\log\left(\frac{1}{512}\right) = (n-1)\log\frac{1}{2}$

$\frac{\left(\log\left(\frac{1}{512}\right)\right)}{\left(\log\left(\frac{1}{2}\right)\right)} + 1 = n = 10$ after 10th pass only one term remains

D 8.5 12.3

60. $a_1 = 1 \quad r = 8$

$a_n = 1(8)^{n-1}$

$a_n = 8^{n-1}$

$S_8 = a_1\left(\frac{1-r^8}{1-r}\right)$

$S_8 = 1\left(\frac{1-8^8}{1-8}\right) = 2,396,745$ squares are removed through stage 8

b) $b_1 = 1 - \frac{1}{9} = \frac{8}{9} \quad r = \frac{8}{9}$

$b_n = \frac{8}{9}\left(\frac{8}{9}\right)^{n-1}$

$b_{12} = \frac{8}{9}\left(\frac{8}{9}\right)^{12-1} \approx 0.2433 \text{ units}^2$ remaining area of the original square after the 12th stage

61. a) For company A

$a_1 = 20{,}000 \quad d = 1000$

$a_n = a_1 + (n-1)d = 20{,}000 + (n-1)1000$

$a_n = 19{,}000 + 1000n$ arithmetic

For company B

$b_1 = 20{,}000 \quad r = 1.04$

$b_n = a_1 r^{n-1}$

$b_n = 20{,}000(1.04)^{n-1}$ geometric

c) for company A

$S_n = n\left(\frac{a_1 + a_n}{2}\right)$

$S_{20} = 20\left(\frac{20{,}000 + 39{,}000}{2}\right)$

$= 590{,}000$

for Company B

$S_n = a_1\left(\frac{1-r^n}{1-r}\right)$

$S_{20} = 20000\left(\frac{1-1.04^{20}}{1-1.04}\right)$

$= 595{,}561.57$